

RUSSIAN AGENCY  
ON PATENTS AND TRADEMARKS

(12) SPECIFICATION OF INVENTION  
TO THE PATENT OF THE RUSSIAN FEDERATION

**METHOD FOR TREATING THE CASES FOR VESICoureTERAL REFLUX**

**ABSTRACT**

FIELD: medicine. SUBSTANCE: method involves introducing polyacrylamide hydrogel into ostium ureteris submucosa of an ureter on the injured side by means of injection until infiltrate roll is formed. Before endoscopic operation being done, the urinary bladder is filled with physiological salt solution to its physiological volume. The urinary bladder is catheterized for 24-28 h after the injection. Reversed urine flow is eliminated due to pressure upon the ureter being increased. EFFECT: avoided recurrences and postoperative complications.

**DESCRIPTION**

The invention relates to medicine, and namely, to urology, and may be used for treating the cases of children's vesicoureteral reflux (VUR) of I – III degree.

Urinary reflux from the bladder into the ureter and renal pelvis is caused by insufficiency of the valvular mechanism of the vesicoureteral junction, which normally provides for urinary drainage only from the ureter into the bladder.

In accordance with the Classification of Heikel-Parkkulainen (1966), which had been taken as the basis of the International Classification of 1981 and is accepted in the world pediatric practice, 5 degrees of VUR are distinguished: In degree I urine is thrown up to the middle third of the ureter, in degree II – up to the renal pelvis, in degree III-IV – into the caliceal-pelvic system, in degree IV pyelectasia and coarsening of arches is noted, in degree V – deformation of the caliceal-pelvic system and hydronephrotic changes are observed.

During the recent years the specific weight of the urinary system pathology attains a growing importance in the morbidity structure of children because of severe complications, which accompany this kind of pathology. VUR is one of frequent forms of urodynamics disorders in children and one of the main causes of the urinary tract infection. It is revealed in

chronic pyelonephritis in 25-60% of cases and in children with VUR pyelonephritis is detected in 80-100% of cases. In 32-78% of patients with VUR the threat of kidney contraction against the background of chronic inflammatory process exists [Osipov I.B., Dzheliyev I.Sh. *Pediatrics* (Pediatrics), 1994, No 6, pp.22-24]. Reflux nephropathy serves as a reason of 15-20% of all cases of terminal renal insufficiency in children and adolescents and as an important cause of hypertension in children. Thus treatment of children with VUR is of decisive importance, as untimely conducted treatment increases the risk of occurrence and complication of concomitant diseases. Thus, for example, in children who were inadequately treated, incidence of renal contraction was 17% and in children who were timely treated, it was only 4.5% [Winberg J. et al. *Pediat. Clin. N. Amer.* 1982, Vol.29, pp.801-814].

In the opinion of a majority of authors, in degree I-II VUR conducting medicamentary therapy with antibacterial drugs [A Textbook of Pediatrics, 1993] in combination with procedures (EHF, UHF currents, electrophoresis, phytotherapy) is sufficient [Osipov I.B., Dzheliyev I.Sh. *Pediatrics* (Pediatrics), 1994, No 6, pp.22-24]. The generally accepted regimens of pyelonephritis therapy are usually used. Patients with chronic cystitis are additionally given local treatment (instillations with dogrose and sea-buckthorn berries oil, camomile decoction, 1% collargol solution), EHF, UHF, electrophoresis with furagin, furadonin), phytotherapy (medicinal tea, bog berry jam, dogrose, oat, parsley decoctions). In hyperreflexory bladder anticholinergic drugs (atropine and the group thereof), coenzymes and vitamins are used. Applying ultrasound and diadynamic currents to the region of the bladder and ureters, paraffin applications, ozocerite are rather efficient. In hyporeflexory bladder M-cholinomimetics or anticholinesterase drugs and hyperbaric oxygenation are used. In this case physician should be sure that further worsening renal function will not occur during this treatment. Otherwise, prolonged treatment of reflux can result in gradual death of renal function. Preventive therapy with antibiotics can be prolonged from 6 months to 2 years.

However, short courses of antibacterial therapy are efficient only in respect to microorganisms of low virulence, but recolonization with microorganisms with manifested virulence is possible; at the same time, treatment with antibiotics promotes the development of side effects (renal functional capability decreases). The instant kind of therapy causes a positive effect in 72.1% of patients with degree I-II VUR. In children with degree III VUR efficacy of antibacterial therapy is only 28% [Osipov I.B., Dzheliyev I.Sh. *Pediatrics* (Pediatrics), 1994, No 6, pp.22-24].

Besides, a high risk of reflux nephropathy development is proved in medicamentary therapy of children with a high degree vesicoureteral reflux [Shiryayev N.D. VUR in children: assessment of therapy results. Abstract of the Doctor of Medical Sciences degree thesis,

Moscow, 23 pages]. The following examination results in 6-8 months of treatment serve as an efficacy criterion of a complex medicamental therapy: normalization of urine, elimination of inflammatory process in the bladder, functional restoration of the sphincter apparatus of the ureter ostia, disappearance or decrease in reflux, stabilization of the pyelonephritic process. As is shown by the practice of leading urologists [Pugachev A.G. *Urologiya I Pediatriya* (Urology and Pediatrics), 1989, No 1, pp.9-13], relapse of disease in medicamental therapy is observed in 55% of cases.

In degree III VUR over 50% of children require surgical treatment, however, electrical stimulation of ureterovesical co-junction has a high efficacy (the Inventor's certificate No 1,558,424, 1990). Essence of the method consists in that electrical stimulation of ureterovesical co-junction is conducted in children on the diseased side with pulsed current of 4-5 Hz frequency in a pulse duration 8 ms, filling frequency 2.5 KHz and amplitude current values 2.5-25.0 mA, electrical stimulation being effected using an electrode-catheter, which is inserted into the ureter ostium for the length of the submucosal section of the ureter.

The instant method allows achieving a positive time course of VUR in 71.4% of cases complete disappearance being observed in 45.2% of cases. Duration (a course of 4-5 procedures every second day in unilateral VUR, 8-10 procedures every second day in bilateral reflux) and possibility of complications of frequent cystoscopy can be attributed to the drawbacks of the instant method.

Besides, if one fails to achieve positive results for a short term (1.5-2 months), then surgical correction needs to be performed as prolonged electrical stimulation can result in still greater renal dysfunction because of a reflux impact that continuously affects thereon [Pugachev A.G. *Urologiya I Pediatriya* (Urology and Pediatrics), 1989, No 1, pp.9-13].

In all cases of degree IV and V reflux probability of spontaneous recovery is low and therefore, an early surgical treatment is conducted following prevention and confirmation of reflux progression.

Creation of a passive valve using a long narrow intravesical submucosal passage in the bladder is the main principle of surgical operations.

The Lich-Gregair's and Politano-Lidtbetter's techniques of extravesical and transvesical plasty are traditionally used.

The Lich's method was described in 1961: incision of the muscular layer is done on the side surface of the bladder without opening of the mucous membrane thereof. The incision length must correspond to a length of the dissected distal portion of the ureter. Thorough hemostasis is performed. A mobilized portion of the ureter is placed into the formed passage, which portion is covered by muscular walls of the passage and these walls are sutured with

catgut sutures. W. Gregair in 1964 had modified the Lich's method for performing anti-reflux operations in narrowing in the bladder-ureteral segment. In this case the ureter is dissected in the narrowing site and the bladder mucosa is opened. Then the margins of the dissected ureteral wall is sutured with the bladder mucosa. Further according to the Lich's method the ureter's mobilized portion is laid down and the passage is sutured.

The Politano-Lidtbetter's operation is described in the literature as early as in 1958 and it is successfully used till the present time. Essence of the method consists in that the ureter ostium is isolated by a circular incision together with intramural portion up to an external wall of the bladder. A catheter is preliminary inserted into the ureter, which catheter assists in isolation of this ureter segment. The length of the mobilized portion is 3-5 cm. The mucosa is opened 3 cm higher the ostium and through the defect thereof a clamp is brought through the muscular wall, the mobilized ureter is grasped and brought out into the bladder. Further a tunnel is created under the bladder mucosa up to the location site of this ureter's ostium, along which tunnel it is just brought through. Subsequently the ureter is sutured up by catgut sutures in the region of the old ostium. Defect of the muscular layer and submucosa is sutured [Lopatkin N.A. and Pugachev A.G. VUR, 1990, pp.68-74].

The essential drawback of this operation consists in that it is performed completely intravesically that can cause the development of a number of complications, since bringing the ureter through the peritoneal cavity or at a very acute angle into the bladder will subsequently lead to disorder of urodynamics. The number of relapses is up to 50%.

During the recent years, the Kohen's operation is usually considered to be the most promising one.. Essence of the method consists in that a catheter is inserted into the ureter ostium, is secured with one interrupted suture to the bladder mucosa. A platform of 1.5-2 cm diameter is cut out around the ostium, intramural portion of the ureter (up to 3-5 cm) is cut out. A submucosal passage is bluntly created parallel to the interureteral plica in a transverse direction. The mobilized ureter is brought through this passage. Interrupted sutures are applied between the earlier dissected bladder mucosa together with the ostium and the mucous membrane of the newly created ostium located above the contralateral one. The region of the old ostium is sutured [Pugachev A.G. Urologiya I Pediatriya (Urology and Pediatrics), 1989, No 1, pp.9-13].

Drawbacks of this method consist in that in a significant dilatation by using only an intravesical access it is impossible to model the ureter for a needed length and besides, some clinicians believe that following Khoen's operation a sclerozed distal segment of the ureter is preserved and retrograde catheterization of the bladder is significantly complicated. The number of relapses is up to 10%. This operation allows enhancing efficacy of surgical treatment of UVR up to 98% [Abramov K.S. Clinical-immunological efficacy of surgical correction of bilateral

VUR. Abstract of the Candidate of Sciences degree thesis. Moscow, 1990, p.19]. Generally a positive effect of anti-reflux operations was noted out in 92.9% of cases [Osipov I.B., Dzheliyev I.Sh. *Pediatrics (Pediatry)*, 1994, No 6, pp.22-24].

Complications of the operations include:

1) pathological processes occurring at the site of operation: inflammation, necrosis of the ureter distal portion with formation of fistulas, stenoses of this portion etc.

2) early relapse of VUR on the side of operation, occurrence of a contralateral reflux;

3) inflammatory complications: cystitis, pyelonephritis;

4) general surgical complications: bleeding from the operation wound, purulence thereof.

The range of therapeutic measures in urology has significantly broadened along with appearance of modern endoscopes. Transurethral therapeutic endoscopy allows avoiding extensive operations, a prolonged epicystostolic drainage and promotes prevention of inflammatory diseases of the urinary tract.

The number of complication of transurethral surgery is significantly lower than in open surgical interventions, however, they exist in the form of secondary bleeding and different injuries of the bladder [The Textbook on Clinical Endoscopy, 1985, 189 pages].

However, progress in urological endoscopy achieved during the last century and appearance of novel instruments and methods for treating give evidence of the fact that this method is promising.

In addition to the operations listed above, reimplantation of the ureters can be used, which allows restoring patency of the upper urinary tract, while the problem of its positive effect on preservation of renal functions, development of the kidneys and preventing progression of chronic pathological process is discussible [Lemer G.R. et al. *Pediat. Clin. N. Amer.* 1987, V. 34. pp.747-770].

In recent years the injections of some substances into submucosa shell, such as a Teflon paste, an ox collagen [Kramer S.A.//*Pediatric* – 1990, - V. 85. - P. 872 – 878], have been used, as an alternative for the re-implantation method.

However, up till now, the question about the biological compatibility of these materials and their suitability for a prolong prevention of VUR is not clear.

In particular, it has been established that Teflon paste in implantation can cause inflammatory reactions and bovine collagen can cause allergic reactions that results in occurrence of postoperative complications [Beck Ch.L. *Laringol/Rhinol. Otol.* 1980, Bd 59, No 11, pp.715-718].

Besides, follow up of late results post implantation has revealed such a form of complication as medial and distal displacement of the implant that results in disorder of

urodynamics.

Recently short communications have appeared about using for the treatment of degree II-IV VUR a novel implant "Deflux", which consists of dextranomer particles in sodium hyaluronate, however the same drawbacks as those for the above listed implants are also inherent to it [Cappozza N. et al. The VIII European Congress of Urologists, Rome, 1997, p.9].

A method for treating vesicoureteral reflux using the Teflon paste "Polytech" [The VII European Congress of Urologists, 1986] is selected as a prototype of the instant invention.

The method consists in that the paste is administered at amount 0.3-1 ml by injection with a special syringe above the ureter ostium under the bladder mucosa at the level of 6 hours under visual control that allows elongating intramural portion of the ureter. Positive results were obtained in 85-90% of patients with congenital degree II VUR.

As was already indicated above, the drawback of this method is occurrence of postoperative complications and relapses; besides, efficacy of this method in degree III VUR is problematic.

The indicated drawbacks are eliminated in the claimed invention.

The task of the invention is the prevention of relapses and reduction of the number of complicating disorders in the treatment of children's vesicoureteral reflux of I – III degree.

The set task is resolved by that, before the endoscopic operation, the bladder is filled with a physiological solution up to the physiological volume, and after that the injection of polyacrylamide gel "Interfall" is made into ostium ureteris submucosa of an ureter on the injured side until the infiltrate roll is formed having the height of 0.7 – 0.8 of the ostium ureteris diameter, and after that an urethral catheter is installed into the bladder for 24 – 48 hours locating the orifice in the region of the ureter.

In the last decade the hydrophilic polyacrylamide gel (PAAG) "Interfall" has received wide clinic use. This gel is produced by Kiev factory of medicinal preparations on the bases of developments of Ukrainian chemists and medical persons. The advantage of this plastic material is the gel-like consistence permitting to introduce it soft tissues by the method of injection by a syringe and a needle [ First International symposium. Development and Introduction of New Polymeric Implantants for Plastic Surgery. – Ukraine, - Kiev, - 1996 – 61 pages).

In comparison with the paste useful for endoprosthesis and comprised of Teflon particles dispersed in glycerol [Berghaus A. H.N.O. 1987, Bd.35, No 6, pp.227-233] or a aqueous solution of a highly purified degraded by polymerization degree bovine collagen useful for the same purpose [Ford Ch. Et al. Laryngoscope, 1984, No 94, pp.513-518], the proposed hydrogel provides for:

1. A more stable clinical effect that excludes the need in repeated endoprosthesis; this

effect is caused by that a crossed-linked polyacrylamide in any implant of a hydrogel is essentially one giant macromolecule. It is non-resorbable, it is not rejected and not fragmented, it is not subjected to destruction and besides, it well retains water as a dispersion medium.

2. Absence of pronounced aseptic reactions, which are observed in administration of the Teflon paste and absence of allergic reactions as those to the season bovine collagen.

Histological observations carried out on animals showed that the hydrogel PAAG "Interfall" causes moderately pronounced reactive events in surrounding tissues only during the first two weeks of follow-up.

An alternative change in the form of mucoid and fibroid swelling, hyalolysis, necrobiosis and necrosis is not noted, as well as foreign body granulomas with giant cells of foreign body resorption are not observed. Adaptation process of the tissues surrounding the gel is limited by organization processes in the form of formation of a gentle-fibered connective tissue capsule. These signs are characteristic of an inert foreign body and they give evidence of the fact that the gel PAAG "Interfall" is from the morphological point of view a low reactive material [The I International Symposium Development and Introduction of Novel Polymeric Implants for Plastic Surgery, Ukraine, Kiev, 1996, 61 pages].

In administration of the gel no signs of circulatory disorders in the form of vascular hyperemia or their emptiness, hemorrhages, swelling, pre-stasis, stasis, thrombosis, ischemia, infarction and embolism are revealed. All these properties of the gel PAAG "Interfall" found during experimental studies, allow significant lowering the number of postoperative complications in the use thereof. Besides, the instant hydrogel is not subjected to resorption, fragmentation and rejection. It is permanently present in the site of inserting thereof surrounded by a thin connective tissue capsule consisting of 1-2 rows of cells of fibrocyte type and connective tissue fibers that prevents expansion thereof along the inter-tissue fissures and getting into vascular lumens that excludes getting into blood and lymph of the gel particles and obstruction therewith blood and lymphatic vessels, that is confirmed by the absence of the gel particles in the regional lymph nodes, intertrabecular spaces as well as the lungs. These properties of the gel determine reliability and clinical efficacy in using thereof for the treatment of vesicoureteral reflux; in administering the PAAG "Interfall" into submucosal region of the ureteral ostia the implant acts as a special load to increase pressure on the ureter that results in elimination of reverse urine flow. Volume of the administered gel is selected individually in each particular case and it is established that the infiltration ridge formed following administration of the gel must be 0.7-0.8 of the ureter ostium diameter. Such ratio allows providing a free physiologic passage of urine from the ureter and preventing relapse of the disease.

The ureter ostium is a specific valve, wherein the front wall of the intramural portion that

is practically deprived of muscular fibers, in gradual elevation of intravesicular pressure is abated against the back muscular wall that prevents from urine regurgitation into the ureter. Because of this peculiarity, preliminary filling of the bladder with normal saline up to physiological level allows elevating accuracy of manipulations in transurethral endoscopic insertion of the gel and providing a visual control over efficacy thereof (preservation of urine passage from the ureter, absence of bleeding). Besides, in the process of filling the bladder elongation of the submucosal tunnel occurs that results in enhanced anti-reflux mechanism.

Postoperative urethral catheterization of the bladder for 24-48 hours with positioning the opening in the region of the ureteral ostium allows maintaining a low intravesicular pressure, releasing tension of the bladder during postoperative period and thus speeding up formation of a thin-wall connective tissue capsule around the inserted implant, that also serves as the prevention of the disease relapses.

Thus the essential distinctive features of the invention provide for achievement of the technical result.

#### Detailed description of the method and examples of a particular embodiment

The method is embodied in the following way. Transurethral endoscopic intervention is conducted on a urologic arm-chair with fixation of the lower extremities on supports under general anesthesia. Following treatment of external teguments with solutions of antiseptics, external genitalia are lined with sterile linen. All manipulations are performed with the Storz ureterocystoscope.

The endoscope is inserted into the bladder, which is preliminary filled with normal saline up to physiologic volume. The bladder mucosa, the ureter ostium and location thereof, submucosal section of the ureter are examined with subsequent selection of the implantation site.

Along the cystoscope channel an endoscopic needle is inserted (its length from the catheter edge to the needle tip is 1 cm) with a guide wire and puncture is done into a preliminary selected site of the submucosa of the ureter ostium. The point located at a distance of 1 to 3 mm from the lower ostium edge is the most rational site of administration. Having been convinced that the puncture is correctly performed, the guide wire is withdrawn, the endoscopic needle is connected to the syringe filled with the polyacrylamide gel PAAG "Interfall", then it is mounted on a special device of the "gun" type and a small amount of the gel is extruded. If the needle is inserted correctly, then the hydrogel in administering forms an infiltration ridge in the submucosal layer of the ureter ostium. Administration of the gel is performed until the height of the infiltration ridge is 0.7-0.8 of the ureter ostium diameter, this typically requiring 0.3-1.0 ml of the gel. Chromocystoscopy by intravenous administration of 0.5 ml 0.4% indigo carmine solution is performed to elucidate urine passage.

Having been convinced that urine passage is preserved and there is no bleeding (in case of bleeding from the mucosa electrocoagulation is performed), the needle and the cystoscope are removed. An urethral catheter is inserted into the bladder locating the orifice in the region of the ureter ostium. A catheter of the Foley type having the size, which corresponds to a child's age (usually No 10-14 by the Sharier's scale) is positioned for 24-48 hours, and thereafter the catheter is removed. In bilateral reflux the same manipulation is performed in 1-6 weeks or simultaneously.

Patient is hospitalized for 3 days. A child is additionally prescribed a conventional antibacterial therapy for 1-3 months.

Disappearance or decrease in urination disorders, absence of relapses of inflammatory diseases serve as efficacy criteria of the conducted therapy.

The results are assessed using the following methods.

1. Monthly examination of urine seeding for 3 months post operation and then every 3 months.
2. Renal functional tests – determination of urea and creatinine, clearance of endogenous creatinine, the maximum urine osmolarity – once annually.
3. Excretory urography in 6-8 months post operation.
4. Miction cystography in 1-1.5 years post operation (only according to indications).
5. Ultrasonic or radioisotope examination in 6-8 months post operation.

Example 1. A child S-n, aged 8 years. Diagnosis: active degree III left vesicoureteral reflux, chronic pyelonephritis. The child was admitted to the Urological department of the Regional Hospital on 25 April 1997. Complaints of urinary incontinence at the day time at a peak of imperative urges. The number of urinations is 10-15; the efficient volume averages 40 ml. The urinary volume on the retrograde cystometry is 73 ml, the detrusor tone is 1.85, the sensitivity threshold is 31 ml.

Laboratory examinations: urinalysis of 25 April 1997: protein 0.033%, urea – 4.7 mmol/l, creatinine – 77  $\mu$ mol/l, leukocytes – 8-10 x.

28 April 1997. Surgical treatment according to the claimed method has been conducted (the protocol No 343). The polyacrylamide gel PAAG "Interfall" was administered, an infiltrative ridge of the height making up 0.7 the ureter ostium diameter was formed. Postoperative period was uneventful.

29 April 1997 Ultrasonic examination of the urinary system.

Conclusion: the signs of VUR are not revealed.

30 April. The child was discharged from the Urological department with a complete elimination of the left VUR.

The child was followed up.

27 October 1997. A check up examination in 6 months.

The child has no complaints.

Ultrasound examination – the signs of VUR were not found.

Blood analysis: creatinine – 79  $\mu\text{mol/l}$ , urea – 4.0 mmol/l.

Urinalysis: protein is absent, leukocytes – 0-0-1x, erythrocytes are absent.

Thus the operation conducted for degree III VUR developed using the PAAG “Inrefall” according to the above-described method, resulted in a complete recovery.

Example 2. A child I-v, aged 10 years and 11 months. He was admitted to the Urological department of the Regional Hospital on 15 September 1997. Diagnosis: bilateral degree III UVR, secondary chronic pyelonephritis, catarrhal cystitis. Complaints of nocturnal incontinence. Case history: therapy with uroseptics was conducted for 6 years, the signs of pyelonephritis and the bladder dysfunction periodically diminished but thereafter the disease recurred.

Laboratory examinations.

Urinalysis: protein – traces, leukocytes – 12-14x, red blood cells – 1-2 modified, epithelium – 10-15x.

Blood analysis: urea – 6.8 mmol/l, creatinine – 90  $\mu\text{mol/l}$ .

16 September 1997. Ultrasonic examination: bilateral vesicoureteral reflux.

17 September 1997. Surgical treatment was conducted according to the claimed method (the protocol No 368). The PAAG “Inrefall” was bilaterally injected until a ridges having respectively the height making up 0.8 of the left ureter ostium and 0.75 of the diameter of the right ureter ostium were formed.

19 September 1997. Ultrasonic examination did not show the signs of VUR and urine drainage disorder for the both kidneys.

The patient was discharged from the hospital under follow up of the district urologists. A check-up examination was recommended in 3 months.

15 December 1997. A check-up examination.

The patient has no complaints.

Ultrasonic examination did not show the signs of VUR. Cystography did not reveal VUR.

Laboratory data.

Blood analysis: creatinine – 73  $\mu\text{mol/l}$ , urea – 5.8 mmol/l,

Urinalysis: protein – absent, leukocytes – 0-0-1x, red blood cells – absent.

The given example supports obtaining a positive result in case of conducting an operation using the proposed method. Bilateral degree III UVR was completely eliminated that was supported by the results of ultrasonic examination and blood and urine analyses.

Example 3. A child M-ko, aged 1 year and 11 months. The child was admitted to the Urological department of the Regional Hospital on 10 September 1997.

Diagnosis: passive degree I vesicoureteral reflux, chronic pyelonephritis.

The patient complained of rare urination with small portions.

Case history: medicament therapy of pyelonephritis was conducted for 6 months.

Cystoscopy of 10 September 1997: Conclusion: non-closing right ureteral ostium.

Laboratory data.

Blood analysis: creatinine – 68  $\mu\text{mol/l}$ ., urea – 6.7 mmol/l,

Urinalysis: protein – 0.033 g/l., leukocytes – 1-2x, red blood cells – 10-15x.

11 September 1997. Operation according to the claimed method was performed (the protocol No 360). The PAAG “Inrefall” was injected until a ridge the height making up 0.8 of the ureter ostium was formed. There were no complications of the operation. The child was discharged from the hospital under follow up of the district urologists. A check-up examination was recommended in 3 months.

1 December 1997. A check-up examination.

The patient has no complaints.

Ultrasonic examination did not show the signs of VUR. Cystography: the ureteral ostia are normal on the both left and right sides.

Laboratory data.

Blood analysis: creatinine – 88  $\mu\text{mol/l}$ ., urea – 5.3 mmol/l,

Urinalysis: protein – correspond to normal ranges.

The given example also supports possibility of a complete elimination of VUR using endoscopic prosthesis with the PAAG “Interfall”. The obtained results of laboratory examination of blood and urine gave evidence of a complete recovery of the child.

Treatment of degree I-III vesicoureteral reflux according to the claimed technique was conducted on 167 children aged from 6 months to 15 years. Postoperative complications were not observed in any case. Follow-up of the patients for 1 year revealed disappearance of reflux in 92 children, decrease thereof down to degree I in 54 children, a relapse was detected in 14 children, in whom repeated injection of the implant was conducted, which resulted in disappearance of reflux and 7 children were operated according to the Kohen’s method.

No macro- and microscopic signs of calcinosis in the sites of injection were found in administering the gel. In 6 months following administration of the gel the signs of cellular and tissue atypism were not detected. Beginning from three months a complete restoration of nervous fibers and their endings takes place.

No any signs of carcinogenic effect of the biogel PAAG “Interfall” on tissues, which

could be manifested by cellular atypism and cellular proliferation, were detected.

Parameters of urine and blood examination were within the normal limits. Seeding of urine did not reveal the presence of microbial flora; the parameters of retrograde cystometry were normal.

Thus the claimed method for the treatment of vesicoureteral reflux by administering as an implant the polycrylamide gel "Interfall" has a rather high clinical efficacy, it allows decreasing the number of relapses and complete excluding postoperative complications. Successful use of the claimed method for treating degree I VUR (in established practice of medicamental therapy) allows not only lowering medicamental load on the child body, but also preventing further progression of diseases. Contraindication to the use of the PAAG "Interfall" were not detected and in view of this, the method can be widely used in urologic practice.

#### CLAIMS

A method for treating of vesicoureteral reflux by injecting a biologically inert substance into ostium ureteris submucosa of an ureter, characterized in that the bladder is preliminary filled with a physiological solution up to the physiological volume, and the injection of polyacrylamide hydrogel "Interfall" is made on the injured side until the infiltrate roll is formed having the height of 0.7 – 0.8 of the ostium ureteris diameter, and, after that, an urethral catheter is installed, locating the orifice in the region of the ureter ostium, for 24 – 48 hours.